



FPR-D RETROFIT INSTRUCTIONS

FOR

FISCHER–PORTER UPGRADE (FPU) SITES

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**U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service - Cooperative Weather Observer Program
Observing Services Division - W/OS7**



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1. Preparation for FPR Retrofit. The FPR equipment will replace all of the FPU equipment without any shared or saved parts. The FPR system is physically smaller than the FPU system, and will be contained within the F&P housing. The FPR solar panel will require a mounting pipe, pole, or post. If the observer consents, you may mount the FPR solar panel where the FPU solar panel is currently mounted. For sites where you must remove the GMA Pole, you should restore the old F&P mounting pipe (Figure 1.1) to its original configuration (Figure 1.1).

Note: The Sutron Kits (FPR-D) do not come with a Solar Panel Mounting Bracket. For this reason you are asked to find a spare legacy F&P solar panel mounting bracket. If your forecast office does not have any of the original one-half inch pipe sections, email your Regional COOP Program Manager, to inquire if a nearby forecast office has spares. An alternative option is a small parts purchase of these commercial off-the shelf parts from a hardware store or Home Depot.

- a. Half-inch galvanized pipe (6-inch to 8-inch section).
- b. Electrical conduit 90° Elbow (i.e., includes small removable access panel).
- c. Half-inch galvanized pipe (24-inch section).
- d. Electrical Cap (optional) to cap the top of the pipe.
Otherwise position the small FPR solar panel directly on top of the pipe to serve as a cap. Another option, is to use silicone sealer (i.e., routine covering of electrical conduit).
- e. Pipe Tape to lock the threads in place and keep them from rusting to each other (i.e., plumbers tape).



Fig 1.1 – Standard Solar Mount for FPR-D is the Legacy Pipe Stand.

1.1 Steps to FPU to FPR Retrofit:

1.1.1 Receive and Inspect FPR Kit in WFO:

Check for all Parts. Do not assemble FPR.

Time Required: 0.25-Hours.

1.1.2 Charge the 12V Battery:

Ensure battery charger indicates ‘full.’

Time Required: As required to indicate ‘Full Charge.’

1.1.3 Transport to Observer's Site:

Keep FPR Kit in original boxes. Save boxes to contain FPU used parts.

Time Required: TBD.

1.1.4 Download Precipitation Data from FPU:

Use Data Key to download most recent 55-days of precipitation.

Use Laptop to download entire contents of Zeno logger.

Time Required: 0.25-Hours.

1.1.5 Drain and Wipe the Collection Bucket:

Time Required: 0.50-Hours.

1.1.6 Disassemble GMA Enclosure and Remove Pole (If Necessary):

Follow detailed instructions in, *FPU Assembly Procedural*.

http://www.nws.noaa.gov/ops2/Surface/documents/FPU_AsmblyPrcdr108212006.pdf

Unplug Solar Cable, and Unplug Battery Cable, and Unplug Load-Cell Cable.

Remove the bonding wire between weighing gage chassis and Enclosure.

Remove 54-lb battery with help of an assistant.

Remove Solar Panel.

Remove Enclosure from Pole.

Remove Conduit from Ground (If necessary). Does not apply to momo-pole sites. If the FPU panel used extended wiring (i.e., buried conduit pipe) and the observer consents to keep the GMA Pole, then follow the same requirements to extend the solar wiring to the FPR-D solar panel. Use watertight connections, above ground connections, and enclose the connections in a small weatherized box.

Remove GMA Pole from ground (if necessary). Does not apply to mono-pole sites.

Note: When the pole is removed, then restore ground to firm, level surface.

Time Required: 3.00-Hours.

1.1.7 Remove the Load Cell:

Time Required: 0.10-Hours.

1.1.8 Install the FPR Load Cell, Logger, Solar Panel:

Follow detailed instructions in Sec 3, 4, and 5, of the *FPR-D Assembly Procedures*.

Time Required: 0.50-Hours.

1.1.9 Calibrate and Verify FPR Performance:

Follow detailed instructions in Sec 9 and 20, of the *FPR-D Assembly Procedures*.

Time Required: 0.10-Hours.

1.1.10 Train the Observer to download the FPR data:

Provide him/her a copy of the, *FPR-D Observer Instructions*.

Time Required: 0.50-Hours.

1.1.11 Complete Metadata and Site Inspection Reports:

Follow the same procedures as in the *FPR-D Assembly Procedures*, adjust words for “FPU to FPR Retrofit” as needed.

Time Required: 1.00-Hours.

1.1.12 Transmit the Precipitation Data to NCDC:

FTP the data from the Data Key.

FTP the data from the Zeno Logger (12-months). Invert to give chronological order.

http://www.nws.noaa.gov/ops2/Surface/documents/FPU_OperationsMan05Feb2007.pdf

Time Required: 1.00-Hours.

1.1.13 Return/Dispose of the FPU Battery and Parts:

The FPU solar panel, the adjustable mounting bracket, and the attached cable (up to the small black box), are the only FPU items that will be returned to National Reconditioning Center (NRC). All other FPU items will be locally disposed according to established NWS disposal guidelines. The process to return the FPU solar panel assembly is covered in Appendix B.

Until all FPUs are removed from the field, Southern region has requested that certain parts be retained as spares for the sites that still have operational FPU equipment. For guidance on this regional initiative see Section 5, and Appendix C for the list of eight field offices

Time Required: TBD.

1.2 Tools and Equipment Required:

Ensure the following tools and test equipment are available before your visit:

Table 1 - Tools and Test Equipment	Section Paragraph in the <i>FPU Assembly Procedural</i> (See App A of this Instruction)
Phillips Screw driver (1/4 inch)	Paragraph 2.5.
Flat Blade Screw driver (1/4 inch)	2.6; 2.8; 2.12; 2.14; 2.15; and 2.16.
7/16" and 9/16" wrenches	2.6; 2.10; and 17.2.
3/32" Allen wrench	3.5; 3.6.
Hand-truck or Dolly	4.2; 13.5; and 17.7.
Multi meter (or voltmeter and ohmmeter)	4.1; 5.7; 5.9; 5.11; 13.8; 17.17; and 17.19.
1/ 2" open wrench	4.4; and 17.7.
Needlenose pliers with wire cutters/strippers	5.2 - 5.4; and 17.12 – 17.14.
Laptop computer with parallel port and running Win95/98ME , for data key reader.	12.2
Laptop computer with modem and terminal emulation program, for access to Zeno data logger. This <u>does not require</u> Win95/98/ME.	7.1 - 7.3; 8.1 – 8.6; 9.1 – 9.8; 11.5; 19.5; and 19.6.
Serial Communications Cable (for laptop) with 9-pin female end and 9-pin male end (<u>not</u> null modem)	7.1 - 7.3; 8.1 – 8.6; 9.1 – 9.8; 11.5; 19.5; and 19.6
Calibration weight set equal to 15 inches equivalent water. See Agency Stock Number D111-TE500.	9.4.5; 9.6.2; and 18.6.
Full size garden shovel	Appendix A

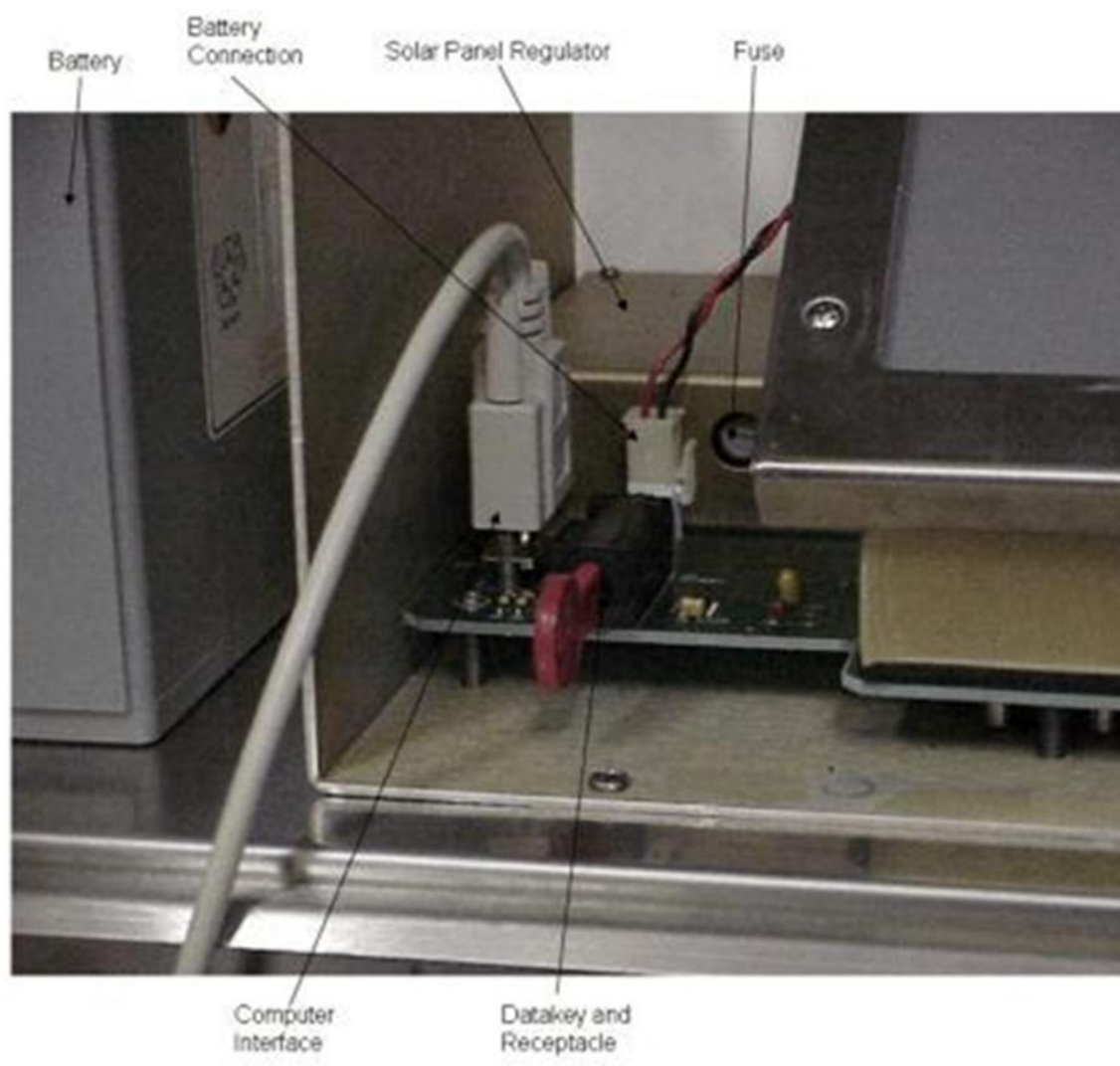


Fig 1.1 – Laptop and Data Key are required for FPU Disassembly.

2. Disassemble FPU Gauge. For a detailed reference on how to disassemble the FPU, first print a copy of the *FPU Assembly Procedural* found on the NWS COOP modernization site: http://www.nws.noaa.gov/ops2/Surface/documents/FPU_AsmblyPrcdr108212006.pdf . Then follow these specific instructions at the COOP site.

- 2.1 **Data Key Download:** Bring a good quality Data Key and download the last 55-days of 15-minute precipitation records. Follow instruction in Section 19.1 of the *FPU Assembly Procedural*. Bring the Data Key back to the WFO to upload the data to your WFO workstation. Use the FTP program to transmit the Zip file to NCDC as if this were the monthly routine.

- 2.2 **FPU Logger Download:** Use your Laptop with HyperTerminal to copy the data contents of the Zeno Logger. Follow instructions in Section 11.5 in the *FPU Assembly Procedural*. Upload the logger file to your WFO workstation as a source of 15-min data as a backup source for any possible missing monthly files. Unreadable Data Keys have caused missing data.



Fig. 2.1 - FPU with GMA Pole.

- 2.3 **Remove Bonding Wire:** Disconnect the bonding wire from the bottom of the Enclosure and from the back of the support stage of the weighing assembly inside the rain gauge. This is the bonding wire installed with *FPU Mod Note #1 (issued Sept 2006)*.
- 2.4 **Remove Solar Power Cable:** Unplug the Solar Cable from the base of the GMA Enclosure (i.e., steel box). See Fig 2.2 to locate the Solar Cable port among the four ports on the underside of the Enclosure.

CAUTION: Section 2.4 involves working on a **LIVE** electrical circuit. Do not allow your screwdriver or the disconnected cable pins to touch any exposed circuits or metal parts.

Note: The Solar Cable port is the one that is located apart from the other three, nearest to the front of the enclosure.

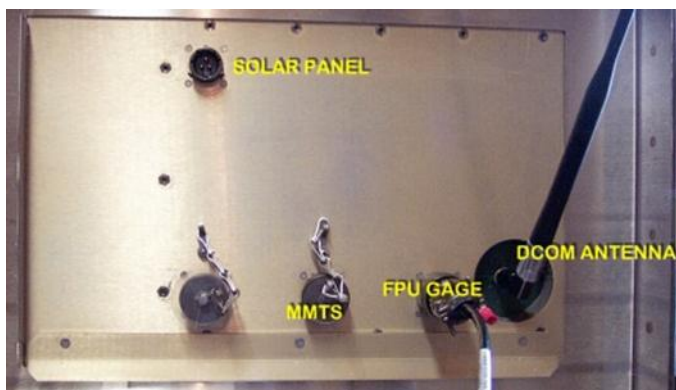


Fig 2.2 – Bottom of Enclosure – Solar and FPU Sockets

- 2.5 **Remove Battery Power:** Unplug the short red/black battery cable from its socket on the Data Key receptacle. This is the short one-foot paired wire from the battery terminals. See illustration in Section 4.6, *FPU Assembly Procedural*.



Fig 2.3 – Inside the Enclosure – Battery and Keypad.

- 2.6 **Unplug the Load-Cell Cable:** In reverse order, follow the instructions in Sec 3.11, of *FPU Assembly Procedural*. Unplug the Load-Cell Cable from the underside of the Enclosure and then unplug the other end from the small white plastic plug inside the F&P housing. Gently pull the cable out through the cable port in the F&P's base plate.
- 2.7 **Dismount Solar Panel from GMA Pole:** Use the Half-Inch Open wrench to unfasten the U-bolts that attach the solar panel to the GMA Pole. Use a ¼ inch flat blade screw

driver to unfasten band-clamps if any were used to secure the solar cable. Leave the U-Bolt secured that holds the mounting bracket for the Enclosure.

2.8 Remove 54-lb Battery from Enclosure:

Leave the battery terminals covered with their caps. If plastic caps are unavailable, wrap the terminals in black electrical tape. Gain the assistance of second person to safely lift and lower the 54-lb battery to a hand-truck or dolly directly below the steel enclosure. Wheel the battery back to the government vehicle. Enclose the battery securely in its own box so it does not shift around. Dispose of the 54-lb battery according to local office policy.



Fig 2.4 - 12V Battery (54-lbs)

Always follow the precautions outlined in NWS Manual 50-1115, *Battery Charging and Storage Operations*, to Chapter 15, on the web site:

https://www.ops1.nws.noaa.gov/Secure/SAFETY/Safety_manual.htm.

2.9 Remove GMA Keypad and Zeno Data Logger: Use a screwdriver to remove the assembly that is attached to the Steel Enclosure.

2.10 Dismount Enclosure from GMA Pole:

Remove any loose items from inside the Steel Enclosure. Close the door. Secure it by closing the latch. Then with an assistant lift up (by one inch) then lower the Steel Enclosure to remove it from its two brackets on the GMA Pole. Rest the Enclosure on a flat level surface.



Fig 2.5 – Enclosure's Top Mounting Hook

Then, with the 9/16-inch wrench unfasten the top U-bolt from the GMA Pole and unfasten the bottom U-Bolt from the GMA Pole. Follow instructions, in reverse order, in Sect 17.2 *FPU Assembly Procedural*.

- 2.11 **Dismount the Load Cell Assembly from F&P Support Stage:** First raise the Shipping Bolt to ensure the plunger is at least $\frac{1}{4}$ inch above the load cell ball. In reverse order follow the instructions in Sections 3.8 through 3.1, of the *FPU Assembly Procedural*. Use the short Allen wrench to loosen the four screws that attach the Load Cell to the support stage.



Fig 2.6 – Load Cell Assembly with 4 screws.

- 2.12 **Remove the Plunger:** With the lower-bracket arm sufficiently raised to expose the plunger, unthread the plunger. Refer to illustration in Sec 3.8, *FPU Assembly Procedural*.

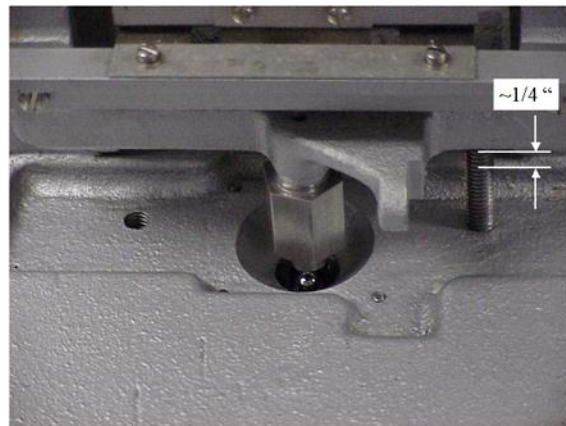


Fig 2.7 - Remove the Plunger (hexagonal)

- 2.13 **Check all 8 Flexures:** There are 4 on the top arm and 4 on the bottom arm. At the front and back of each arm there is one horizontal flexure and one vertical flexure. Replace any flexure that is bent, kinked, cracked, or broken.

Caution: The upper-rear-horizontal flexure is the one most susceptible to bending and damage. When moving the parallel arms, move them slowly and do not let them bounce.

All flexures must be flat and in good condition and all flexure mounting screws must be tight to ensure proper operation with the load cell.

- 2.14 **Retrieve all FPU Parts and Tools:** Collect all the tools (See Table 1, on Page 5) and collect all FPU parts (see Section 4, below) and all decanted fluids from the collection bucket, and any excess supplies from this maintenance action.

Caution: Always request the help of another person to lift or move the 54-lb battery. Use a hand-truck or dolly wherever possible to move battery between locations.

- 2.15 **Pack Used Parts into Cardboard Boxes:** Boxes can protect from damage the interior of the Government truck/van. Use cardboard to protect the solar panel from getting scratched, and use cardboard to protect the metal edges of the panel.

3. For Sites with Separate GMA Pole – Remove Pole and Restore Grounds:

Half of all the FPU sites have a separate stand-alone 6-foot pole planted within 5-feet of the F&P three legged stand (Fig 2.1). The pole served to mount the Enclosure at a convenient height for the observer's routine access, and also be a mount for the solar panel. This pole bore the heavy weight, approximately 90 lbs., of the steel enclosure box, 12V battery, Zeno data logger, and the solar panel.

3.1 Coordinate with COOP Observer: Before calling, decide whether you will use the GMA Pole to mount the FPR solar panel, or one of the pipe stands, or attach the panel to one of the three legs of the F&P stand. Phone the COOP Observer and inform him/her how this FPR modernization will result in less equipment on site. Explain how the new electronic recorder is a compact module that fits within the white shell of the rain gauge. Consequently, we remove the steel enclosure and its mounting pole. If you are not going to use the pole, inform the Observer you will remove the pole and restore the grounds where the pole was planted and will bring grass-seed if requested.

Inquire about the general condition of the grounds about the GMA pole. Are there special tools required if the ground is rocky, compacted clay, compacted soil, or is it loose soil or a sandy composition?

3.2 Excavate Pole and Fill Hole (if required): First, ensure all cables and grounding wires are removed from the site. Ensure the 12V battery was removed from the Enclosure, ensure the Solar Panel and the Enclosure have been removed from the GMA Pole.

Then use the garden shovel to dig the grounds about the concrete base of the GMA pole. Installation instructions had called for it to be buried at least 25-inches below ground surface.

Some sites, exposed to high winds, might have more concrete at the surface and have a deeper footing. Depending on the amount of concrete attached to the base of the pole, shovel away as much of the surrounding ground to expose the bottom of the concrete footing.



Fig 3.1 – Restore Grounds.

Some posts might have been modified with welded plates or rebar inserted to prevent twisting motion from wind loading. If so, then excavate more of the grounds about the post to free-up to the entire post and its footing.

If extra excavation does not work to dislodge the pole, it may be possible to cinch a heavy chain about the pole and pull the chain with the truck/van to dislodge the pole.

Dispose of the concrete footer together with pipe post in accordance with local policy.

With the garden shovel, fill-in the hole with any displaced soil in an effort to restore the grounds. Make the ground as level as possible and then tamp down with shovel to make the ground as firm as possible. If the ground had been grass covered in 2005 prior to FPU installation, replant this area with grass seed and water the ground. Cover the grass seed with straw or light mulch to retain moisture for germination of grass. One cubic foot of mulch should cover an area, 2-feet by 2-feet. Bags of mulch can be purchased at large home improvement stores.

4. Disposition of FPU Parts:

Retrieve Solar Panel and Mounting Bracket: All offices will retain the Solar Panel, and Solar Mounting Bracket and return them to the National Reconditioning Center (NRC) as instructed in Appendix B (page 20).

- Solar Panel - ASN D111C-3



Fig 4.1 - Solar Panel

- Solar Panel Cable – ASN D111C-3W1: The Solar Panel Cable (D111C-3W1) does **not** need to be returned to NRC. Disconnect the cable attached to the solar panel from the box pictured here. Please leave the attached cable as long as possible.



Fig 4.2 - Solar Panel Cable

Note: If D111C-3W1 was used to extend the solar panel location or was buried or in conduit from the solar panel location, you can use it to extend the FPR solar panel wiring, as well. Just cut off the mil connector and wire to the appropriate terminal strip connection.

- Solar Mounting Bracket

(Photo Unavailable)

Figure 4.3 – Solar Mounting Bracket

Donors Needed: NWS headquarters asks Observation Program Leaders (OPL) to volunteer to ship good quality FPU parts to one or more Southern Region forecast offices (Appendix B).

See Section 5, Donor Volunteers for Southern Region, if you have at least one set of good quality FPU parts as listed.

Dispose of these FPU parts locally, in accordance with local office policy.

- Gauge Modification Assembly (GMA).

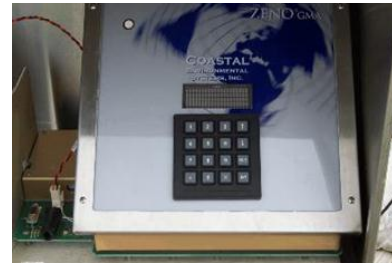


Fig 4.4 – GMA Assembly

- 12V 84-AmpHr Battery



Fig 4.5 – FPU Battery

- Load Cell Assembly

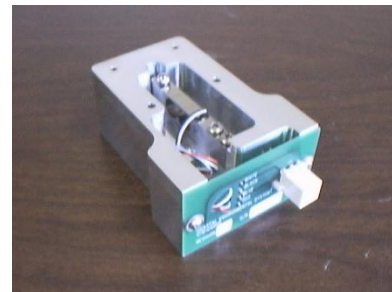


Fig 4.6 – FPU Sensor

- Load Cell Cable



Fig 4.7 – Sensor Cable

Dispose of these FPU parts locally, in accordance with local office policy. (Continued)

- Solar Panel Cable



Fig 4.8 – Solar Cable

- FPU Battery Cable



Fig 4.9 – Battery Cable

- Data Key Reader Device, Software CD, and AC power adaptor.



Fig 4.10 – CES Inc. Key Reader Parts

- FPU Enclosure (ASN D111C-2A4)



Fig 4.11 – Stainless Steel Enclosure

Note: Metal parts can be turned in to a metal recycler facility if one is available within reasonable distance of your WFO.

5. Donor Volunteers for Southern Region: NWSHQ requests OPLs to volunteer and ship at least one complete set of FPU equipment, as defined by the parts for these six parts of FPU equipment.

1. GMA Assembly, with Steel Enclosure (exclude 12V battery)
2. Load Cell Sensor, with Plunger, Four machine screws, and Four washers
3. Load Cell Cable
4. Solar Power Cable
5. Data Key Reader, with CD operating disk
6. Spare Data Key(s)

Quality and Condition of Used Parts: NWS Logistics has determined that as you disassemble the FPU gauges, you will know if the parts you are removing are worth retaining for shipment to the designated forecast offices in Appendix C.

Local Office Instruction: Email your Regional Cooperative Program Manager (RCPM) to inform him/her you intend to package and ship these FPU parts to one or more Southern Region Offices.

Regional Office Instruction: Email the OS7 (Tom Trunk) before Oct 15, 2012, the names of all OPL who have volunteered from your region to donate a set of FPU parts.

National Office Instruction: The National COOP Program Manager will ensure a minimum of one FPU spares set is allocated to each of the eight offices in Southern Region. Specific packing and shipping guidance will be issued as an update to these instructions.

APPENDIX A – REQUIRED HANDBOOKS FOR FPU DISASSEMBLY

1. Primary Resources On-Line:

- a. http://www.nws.noaa.gov/ops2/Surface/documents/FPU_AsmblyPrcdr108212006.pdf
FPU Assembly Procedural – Aug 2006
- b. http://www.nws.noaa.gov/ops2/Surface/documents/FPU_OperationsMan05Feb2007.pdf
FPU Operations Manual – Jan 2007
- c. http://www.nws.noaa.gov/ops2/Surface/documents/FPR_AsmblyPrcdr11December2009.pdf *FPR-D Assembly Procedures - Dec 2009.*
- d. <http://www.srh.noaa.gov/ohx/dad/coop/FPR.html>
- NWSTC Training Class – Clear, labeled photos of the new rain gauge, produced by Ralph Troutman (OHX).
- e. http://www.srh.noaa.gov/ohx/dad/coop/f-p_images
- Clear photos of the original F&P rain gauge.

2. FPR Help Line at the Sterling Field Support Center (SFSC):

Phone the Sterling Field Support Center (SFSC), 8:30am – 5:00pm, Monday – Friday, on 703-661-1268; or e-mail them, nws.sfsc@noaa.gov . Before calling SFSC, write down the issue or question and inform your Regional COOP Manager by phone or email.

SFSC Contact Center Information

Main Line: 703-661-1268
Back-up Line: 703-661-1293
Email: nws.sfsc@noaa.gov

Contact the SFSC when you need to troubleshoot potential issues with the FPR kits. The SFSC is closed on all federal holidays. All emails and phone calls received during the hours of operation will be responded to in a timely manner. Emails received during non-operation hours will be returned in the order they are received on the following day in which the facility is open.

Your phone call to the SFSC should be the first point of contact made when you have any issue with the FPR kits. If the SFSC is unable to determine the correction for the issue, the SFSC will elevate it to NWS Headquarter level.

APPENDIX B – FPU SOLAR PANEL RETURN TO N.R.C.

Instructions for Return of Solar Panel and Mounting Bracket

NWS COOP Program

1. **Prepare a Form H-14, Equipment Return Tag:** Fill out all 12 boxes. Take special care to write-in the explanation, as noted in Line Item #11.

Line Item in Form H-14:

1. Station Call Letter: i.e., PAH
2. Org Code for your WFO: i.e., WR9957
3. Task Number: N/A
4. Failure Date: Date you installed the FPR.
5. Item Name: **'Solar Panel and Mounting Bracket.'**
6. Write the ASN: **" D111C-3 "**
7. Solar Panel: **Leave Blank.**
8. Chassis S/N: **Leave Blank**
9. Primary Reason for Return: check box **" 5 "**

"Instructions from Weather Service Headquarters"

- 10A. The A-23 document number: **" N/A "**
- 10B. Requisition Number: **Leave this blank... or put ' N/A '**
11. Write: **"FPU Solar Panel Return to NRC."**
12. Your name and Phone #.

2. **Enclose WS Form H-14:** Make sure the H-14 is complete and enclosed in the box you will send the Solar Panel and Solar Cable to National Reconditioning Center (NRC).
3. **Pack the FPU Solar Panel and Mounting Bracket:** If the Solar Panel and Mounting Bracket (D111C-3) fits, then use one of the recent boxes in which your new FPR kit was shipped. Use the same padding, clear plastic wrap, to protect the Solar Panel.

Otherwise, if needed, order a corrugated cardboard box from a commercial source (i.e., UPS, or ULINE), and order any padding or packing material that will protect the glass on the solar panel. For ULINE, a minimum order quantity of 5 boxes is required for double wall corrugated (36-inch x 24-inch x 12-inch) and the price per box is \$6.65. For information, access www.uline.com, and enter the dimensions of the box needed.

4. **Ship to National Reconditioning Center (NRC):** Prepare a UPS Shipping Label, as follows – as you would any part that requires repair work.

NOAA-National Reconditioning Center (NRC)
Weather Systems Repair Branch (W-OPS62) Org Code: WG9162
1520 East Bannister Road
Kansas City, Missouri 64131-3009
816-823-1057 x245 (Rick Vogel)

5. **Use Your Ordinary UPS Shipping Account:** At the time this instruction was issued, (Sep 24, 2012) there were no available national funds to offset your shipping expenses.
6. **Query the UPS Account Statement:** Obtain the ‘dollar amount’ to ship the solar panel, bracket, and cable, to National Reconditioning Center (NRC). Then email this Dollar amount to your Regional Cooperative Program Manager (RCPM) and inform him/her that you have shipped the solar panel to NRC.



Fig 5.1 – Solar Panel with Mounting
(view with mounting bracket visible)

End of Shipping Instructions for Solar Panel, and Bracket.

APPENDIX C – OFFICES IN NEED OF FPU SPARE PARTS

WFO	REGN	FPU	VOLUNTEER DONOR OFFICES (WFO, and Name of OPL)
Memphis (MEG)	SR	32	
Shreveport (SHV)	SR	32	
San Juan (SJU)	SR	23	
Rapid City (UNR)	CR	19	
Nashville (OHX)	SR	16	
Flagstaff (FGZ)	WR	12	
Dodge City (DDC)	CR	8	
Morristown/Knoxville (MRX)	SR	7	

Note: These eight offices have 100% of their recording rain gauges operating with the Fischer-Porter Upgrade (FPU) equipment. These offices are afforded additional time beyond April 1, 2013, to retrofit all of their FPU gauges to Fischer-Porter Rebuild (FPR-E) equipment.

APPENDIX D - FPU PARTS AND AGENCY STOCK NUMBERS (ASN)

General Name	Short Description	Long Description	ASN	SMR *
Load Cell Assembly	Load Cell Assembly, FPU	Load Cell Assembly, FPU, complete with load cell PCB, block, post, cell, ball, and 4 long machine screws with washers and lockwashers.	D111C-1A1	PADDD
Load Cell Cable	Load Cell Cable, FPU	Load Cell Cable, FPU, 8 feet long, with connectors and integral strain relief.	D111C-1W1	PAOZZ
Anvil	Post, FPU, load cell.	Anvil or post for FPU load cell, mates F&P gauge to load cell ball.	D111C-1A2	PAOZZ
GMA	ZENO-GMA, FPU	Gauge Modification Assembly for Fisher & Porter Gauge Upgrade, includes Zeno datalogger, solar panel regulator, display, keypad, data key interface, and housing.	D111C-2A1	PAODD
- Regulator	Regulator PCB for Solar Panel, GMA, FPU	Regulator PCB for Solar Panel, GMA, FPU	D111C-2A1A3A1	PADDD
- Fuse	Fuse, Glass Tube, 250V, 3AG, Normal, 5-Amp	5 Amp fuse for solar panel regulator of GMA. Place holder. Pointer to ASN: 017-F-4-35 for real stock number.	D111C-2A1F1	PAOZZ
- DataKey	DataKey, serial memory key, 1Mb, SFK series	DataKey, serial memory key, 1Mb, SFK series flash memory, Datakey Electronics, Inc, PN 611-0083-002, Red color.	D111C-2A2	PAOZZ
- Battery	Battery, 12V, 84AH, Sealed Lead Acid	Battery, 12V, 84AH, Deep Cycle, AGM, Sealed Lead Acid, Bolt terminals, 54 lbs, wide temperature range, for solar panel applications, Concorde Battery Corporation, PVX-840T, Sun Xtender Series.	D111C-2B1	PAOZZ
- Cable, battery	Cable, Battery, internal to GMA, FPU	Battery Cable for inside GMA enclosure.	D111C-2W1	PAOZZ
- Enclosure	Enclosure, Steel, GMA, FPU.	Stainless Steel Enclosure, GMA, FPU, with mounting hardware and parts.	D111C-2A4	PAOZZ

Solar Panel	Solar Panel, 20W, 12V nom. @ 1.5A, reverse diode included, no regulator.	Solar Panel, 20W, Siemens ST20, 12V nom. @ 1.5A, reverse diode included, no regulator, metal frame, with pole mounting bracket.	D111C-3	PAODD
- Cable, Solar Panel	Cable, Solar Panel to GMA, FPU.	Solar Panel Cable, with connector and junction box, use between FPU GMA and ST20 solar panel	D111C-3W1	PAOZZ
FPU External Parts	Cable, Thermistor to GMA, FPU	Thermistor cable, direct burial, use between MMTS beehive and GMA.	D111C-4W1	PADDD
FPU Off-Site Parts	DataKey reader, power supply, and application CD-rom.	DataKey reader, power supply, and application CD-rom , for use with FPU written Datakeys.	D111C-6	PAOZZ
FPU Test Plug	Testing instrument to isolate the rain gauge load sensor.	FPU Load Sensor Test Plug	D111C-1A1T1	PAOZZ

* The FPU unit has just three types of Source, Maintenance, and Recoverability (SMR) codes assigned to its parts: PADDD, PAODD, and PAOZZ.

Reference: **EHB-1, Instrumental Equipment Catalog (Issuance 1996-1)**, Section 2.3, Source, Maintenance and Recoverability Code (SM&R).

PADDD: You must return these parts (i.e., faulty regulator) to National Reconditioning Center (NRC) in exchange for a replacement. The 'PA' signifies item procured and stocked for anticipated or known usage that is not deteriorative in nature; the 'DD' signifies the part must be shipped to the depot (NRC) together with its integral component(s) for disassembly and be repaired by the depot (NRC); and the final 'D' signifies that just the depot (NRC) is authorized to repair, condemn, or dispose of this part.

PAODD: You must return these parts (i.e., faulty GMA) to NRC in exchange for a replacement. The 'PA' signifies item procured and stocked for anticipated or known usage that is not deteriorative in nature; the 'OD' signifies this part shall be isolated and removed by the field and shipped to the depot (NRC) where the depot (NRC) will perform the repair; and the final 'D' signifies that just the depot (NRC) is authorized to repair, condemn, or dispose of this part.

PAOZZ: A non-repairable part. You may dispose of these parts (i.e., 5 Amp fuse) at the Weather Forecast Office (WFO). The 'PA' signifies item procured and stocked for anticipated or known usage that is not deteriorative in nature; the 'OZ' signifies the field level shall remove and replace this part, however it is non-repairable and no repair to the item is authorized. The final 'Z' signifies that the field office is authorized to condemn and dispose of the part when it becomes unserviceable.